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AGRICULTURAL NEWS LETTER

VOL. 13 - NO. 4 JULY-AUGUST, 1945

This publication contains information regarding new developments of interest to agriculture based on laboratory and field investigations of the du Pont Company and its subsidiary companies. It also contains published reports and direct contributions of investigators of agricultural experiment stations and other institutions as related to the Company's products and other subjects of agricultural interest.

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Public Relations Department
E. I. du Pont de Nemours & Company (Inc.)
L. F. Livingston, Manager

Gus M. Oehm,
Agricultural Editor,
Wilmington 98, Delaware

M. H. Bruner,
Agricultural
Consultant,
Clemson, S. C.

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H. F. Dietz, Entomologist,
Pest Control Research Section,
Grasselli Chemicals Department

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"BLASTING CAP!" -- NEW, DRAMATIC MOVIE FOR BOYS

How an airman who has flown more than a hundred sorties against the enemy is scared for the first time when he returns home to face deadly danger on his own front lawn -- this is the situation around which turns the fast-moving story of "Blasting Cap!", a two-reel sound and color film drama just released by the Institute of Makers of Explosives. The film was produced as part of the Institute's continuing campaign to end the serious accidents that occur each year as a result of children playing with the blasting caps used to detonate dynamite. The Institute is also campaigning to prevent careless workmen leaving the caps in places where they can get into the hands of children.

Leading technologists of the explosives industry collaborated with the scenarists. The film is technically accurate in all details of the use of explosives, but it is produced specifically for young boys who like drama and suspense. Scenes of dynamite in action, in quarries, mines, and on the farm, are shown in full color. They fit into a quickly paced story that builds up to a tense climax centering around the flyer and his young brother and sister.

Requests for loan of 16-mm. prints to be shown to boy audiences should be addressed to Institute of Makers of Explosives, 103 Park Avenue, New York, N. Y. They should be made as far in advance as possible, should indicate date desired, and estimated attendance.

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DOES YOUR DITCH NEED BLASTING?

Most drainage ditches need cleaning out in five to seven years after being dug, depending on the type of soil and the grade of ditches, according to Du Pont explosives experts. If a ditch is completely filled, it is loaded and shot with dynamite as a new ditch. When the banks of a partially filled ditch are higher than three feet, more dynamite is required to throw mud and debris over them. The additional amount necessary is determined by a test shot under the supervision of an experienced blaster. The original side walls of the ditch must not be disturbed, otherwise the next high water will wash the loosened material into the ditch bottom. Drainage authorities say it is usually difficult to clean a ditch that is not at least twice as wide at the top as it is deep, unless the top is to be widened also.

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UREA HAS MANY AGRICULTURAL USES

Urea, the first organic compound ever to be synthesized, is now one of the country's most versatile chemical "farm hands."

This silent partner of agriculture is first and foremost a fertilizer material. Thousands of tons of fertilizer containing urea-ammonia liquors or "Uramon" fertilizer compound which supplies 42 per cent urea nitrogen are applied to the soil each year. In addition to providing crops with the growth-element nitrogen, urea more recently has been found useful in controlling a serious poultry disease, in speeding the healing of wounds of farm animals, and as feed for certain livestock -- all important wartime contributions to the increased production of food, feed, fiber, and fats.

New information based on preliminary experiments suggests the possibility of applying at least part of the fertilizer nitrogen as urea to apple trees, in foliage sprays designed for disease and insect control. But considerable additional research, now underway, is needed before practical recommendations can be made.

Urea As An Ingredient to Supply Part of the Protein in Feeds for Ruminants

Urea is used to replace effectively part of the protein supplements in the ration of ruminants, such as cattle. The urea is not utilized directly, but is rapidly changed to ammonia in the paunch or rumen of the animal. This ammonia is used by the micro-organisms growing in the feed mass within the rumen. The protein produced by these micro-organisms is later utilized by the animal.

Early in 1944, Du Pont's Ammonia Department announced a new material, "Two-Sixty-Two" feed compound, which supplies 42 per cent urea nitrogen or 262 per cent crude protein equivalent. Every pound therefore has nitrogen equivalent to 2.62 pounds of crude protein. The new feed compound has free-flowing characteristics. It is easy to handle and mix with other feed ingredients.

Previous to introduction of "Two-Sixty-Two" feed compound, the War Production Board had for some months allocated crystal urea to manufacturers for inclusion in their feeds for ruminants, thus aiding considerably in the solution of the critical wartime feed problems created by acute shortages of the usual protein supplements. More than 14,000,000 bags of mixed feeds containing crystal urea or more recently "Two-Sixty-Two" feed compound were fed to ruminants in this country between late 1943 and the end of 1944.

A significant development in connection with the use of urea in cattle feed was reported from the Mississippi Agricultural Experiment Station following experiments with sorghum silage. Urea was sprinkled over freshly cut sweet

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sorghum at the rate of 10 pounds per ton of material as it entered the silo. In this original experiment, more carotene, which supplies vitamin A, was found in treated than in untreated silage. The cattle showed a definite preference for the treated material, indicating that the urea enhanced the palatability of the silage to which it was added. Cows fed treated silage maintained their weight through the 78-day wintering tests, while those fed untreated silage lost an average of 47 pounds during the same period. The difference in condition of the animals was plainly evident at the end of the test, it was reported.

Several other agricultural experiment stations are now conducting further studies on the use of urea in silage, early preliminary reports indicating a considerable variation in results in different states.

In addition, several state experiment stations are investigating the value of urea as a supplement in wintering rations for feed-lot use with range cattle and heifers. Silage, cottonseed and soybean meals, corn, and beet pulp have been among the feeds so supplemented. Preliminary results indicate urea may be more effectively used in maintenance diets that in fattening rations.

Urea Important Ingredient in Medicaments for Poultry and Livestock

One veterinary-medicine house combines equal parts of urea and microfine sulfur to produce a proprietary product to aid in the control of coccidiosis, the dread poultry disease that kills 100,000,000 baby chicks every year. In carefully controlled experiments, this preparation saved two out of three birds that normally would have died of the ailment.

The use of sulfa drugs is now accepted as one of the most important forward steps in wound treatment developed during the war. Now, a new method of dry-dressing wounds with a powder combining urea with sulfa drugs makes possible maximum wound sterilization in minimum time, a procedure that Army doctors say is preferable to sulfa drugs alone. Veterinarians who have tried the mixture on livestock predict it will largely supplant present methods for treating the wounds of farm animals.

Several years ago it was reported in medical journals that intracutaneous injection of urea in solution at the base of the growths provides a simple and effective method of removing warts from livestock. In tests made by qualified veterinarians, warts of different sizes and types were permanently removed from horses, leaving no scars. The places from which the warts were removed were subsequently covered with a new growth of hair.

Phenothiazine, administered by a veterinarian, is used to remove and destroy redworms, also known as Sclerostomes or Palisade worms, that infest horses, once they have entered the animal's intestinal tract. However, if the eggs of the redworm, one of the more destructive roundworm group, can be destroyed in the manure heap, a large percentage of the larvae will be prevented from re-entering the host. In experiments conducted at McGill University, Canada, urea was found to be "the most lethal" of ten carriers of

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nitrogen fertilizer used. These studies suggest that about 15 pounds of urea per ton of manure, whether dry or in solution, will prove effective against Sclerostomes in fresh feces.

Treating Wood With Solution Containing Urea

The versatility of urea as an aid to agriculture is indicated by the fact that it is used in treating wood -- an important product of farm and forest -- to eliminate seasoning degrades in sawed lumber. It inhibits or stops splitting, checking, honeycombing or "hollow horning," warping, and internal collapse. It is also used for bending wood, and for seasoning poles, pilings, and posts; staves and headings for cooperage; hickory handles; bobbin-and-shuttle stock; and similar items.

Urea is an important component or raw material in numerous other chemical compounds which are useful to agriculture. As a single example, urea enters into the manufacture of ammonium sulfamate, the active ingredient in a new weed killer which has especial value to orchardists and other growers of farm crops in the control of poison ivy and numerous other noxious weeds.

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NYLON PAINT-BRUSH BRISTLES LAST LONGER

The hog bristles used in the manufacture of paint brushes before the war did not come from American farms; they came from the Orient. War with Japan cut off that supply. However, American industrial research was on the job. Du Pont chemists and engineers, after 25 years of search for a synthetic bristle engineered to exact specifications of size, properties, and qualities to replace the variable natural material, announced shortly after Pearl Harbor that it was possible to make a nylon filament with the requisite taper, resilience, toughness, length, uniformity in diameter, and inertness to paint and cleaner ingredients.

Farmers and others who need to replace their old, worn-out hog-bristled brushes after the war will find that nylon brushes wear at least three times as long. Meanwhile, Uncle Sam has first call. In fact, more than a million and a half nylon paint brushes have already gone to the U. S. Navy.

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EXPERIMENT STATION CIRCULAR TELLS HOW TO DYNAMITE OLD APPLE TREES

The first thing to do when preparing to dynamite an old apple tree is to bore one or more holes, about 2½ inches in diameter, on an angle so that the bottom of the hole is about three feet under the heart of the tree, according to Ohio Experiment Station Special Circular 68, "Removal of Apple Trees." When roots interfere with drilling, it may be necessary to set off a light shot to make a large enough aperture for the full charge.

The Ohio circular has excellent pictures, with explanatory legends that reveal the following procedure:

A worker familiar with dynamite places a stick, with an electric blasting cap attached, in the hole, adding enough more sticks to blow out the tree. He forces the entire charge carefully into place with a wooden hoe or fork handle. He then tamps the soil into the hole. All workmen take cover behind trees 100 feet or more away. When a two-way insulated electric wire, attached to the electric blasting cap wires at one end, is touched to the points of an automobile battery at the other, the explosion occurs instantaneously.

A large, sturdy tree, blown clear of the ground, usually lies on its side, ready to be trimmed. If the shock shatters a decayed trunk, a tractor will readily pull the tree out. Brush is burned, and the larger limbs dragged to a central point to be stacked for sawing into firewood.

DYNAMITE USED TO REMOVE HALF-CENTURY-OLD APPLE TREES FROM TEST ORCHARD

When the Ohio Agricultural Experiment Station decided to remove some 50-year-old trees from an apple orchard at Wooster, dynamite was used to dislodge the trees, which were too large, old, and brittle to be pulled by tractor or block and tackle.

Trunks were partially hollow, and the wood too brash to withstand breakage from pulling. Since the site was to be replanted with younger trees, dynamite was especially helpful because it removed most of the roots, which were extensive and deep. And the explosion cleaned the heavy dirt from the exposed roots, resulting in considerable saving in hand labor necessary to remove the accumulations of soil from the roots when trees are pulled.

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C. W. Ellenwood, T. E. Fowler, and J. T. Yoder, Jr., in the Station's Special Circular 68, "Removal of Apple Trees," a pictorial record of the various operations, recommend use of dynamite as the most practical way to remove deep-rooted apple trees that are more than 25 years old. They say that many apple trees should be removed by their thirty-fifth year. Thereafter they are usually less profitable than younger trees; pruning, spraying, and harvesting costs tend to increase; and quality of the fruit is not as good as from trees 15 to 30 years old.

The trees were planted in 1893 as a variety trial orchard, and several hundred varieties were tested during the half century. Some of the original trees had been removed earlier, and other trees planted. The diameter of the trunks of the original trees averaged 20.7 inches, ranging from 14 for Wealthy to 27 for some large-growing varieties, like Baldwin, White Pippin, and Rhode Island Greening. Tops of the trees occupied practically the entire area, 33 by 33 feet, between the trees.

Of the 153 trees removed, 103 ranged in age from 35 to 50 years, and 50 were younger. A block of 16-year-old trees was pulled quickly with a tractor, using a direct hitch. The 16-year-olds were near the age limit when they can be removed by direct pull, the Ohio circular says.

Expert In Use of Dynamite Sets Charges

An expert workman familiar with dynamite set the charges. He was assisted by the regular orchard force. Records were kept of time consumed and cost of removal of trees and brush, as well as for sawing the cord wood.

The Ohio circular explains the procedure as follows:

In blowing out 153 trees, 295½ pounds of dynamite were used, an average of 1.9 pounds per tree. On the larger trees, 2½ to 3 pounds were used. Electric blasting caps with wire attachments 6 feet long, rather than the powder fuse, were used to explode the dynamite. The work was done during the winter months when the soil was moist. The electric blasting caps were fastened to a two-way insulated wire circuit about 100 feet long. When the charge was ready, the other ends of these wires were placed in contact with the poles of a second-hand automobile battery. The explosions occurred instantaneously. The electric blasting caps were considered safer and more dependable than the powder fuse.

The circular says the use of dynamite adds to the cost of removing trees, but points out that part of the additional cost is offset by the fact that the roots of dynamited trees are much freer from soil than those pulled by tractor.

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Cost of Removing 153 Apple Trees in Ohio Experiment Station Orchard

	Number of hours	Rate	Total Cost
Expert blaster	47½	$0.90	$ 42.75
Miscellaneous labor	1204	.45	541.80
Tractor for pulling stumps and trunks	43	.50	21.50
Tractor for buzzing cord wood	28	.50	14.00
60% dynamite, 295½ lb.	....	.30	88.65
Electric blasting caps, 200	....	.08	16.00
Total cost of removing 153 trees (5 acres)	....	....	724.70
Credit for 200 cords of wood @ $2.00	....	....	400.00
Net cost of removing trees and clearing land ready for plowing	....	....	324.70
Cost per acre	....	....	81.19
Cost per tree	....	....	2.12

"The use of dynamite, to some extent at least, facilitates the preparation of the land for the growing of cover crops," it adds. "In the case of apple trees growing on Wooster silt loam or, in fact, on any type of soil which permits deep rooting, dynamite would seem to be practical for removing trees more than 25 years old. Younger trees can be more economically removed by the use of a tractor."

Firewood from Apple Trees

"A part of the cost of tree removal can sometimes be offset by utilizing the trunks of the trees and the larger limbs for firewood," according to the circular. "Apple wood makes excellent fuel for burning in open grates or fireplaces."

The publication says the 50-year-old trees removed from the Station orchard provided a large quantity of good-size wood.

"Approximately 200 face cords of firewood were salvaged from the 153 trees removed. A face cord in this instance consisted of a stack of wood cut into 19 to 20-inch lengths, 8 feet long, and 4 feet high. This wood sold for $2 per cord in the orchard."

The circular says there is comparatively little danger attached to this type of use of dynamite, but adds: "The average workman is not familiar with methods of using it, and it is generally safer to have someone skilled in its use to set the charges and attach the fuses."

NOTE: A copy of Ohio Experiment Station Special Circular 68, which contains excellent pictures taken by H. G. Binau, Station photographer, will be sent upon request to Prof. C. W. Ellenwood, Ohio Experiment Station, Wooster, Ohio.

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RESPONSE OF TURKEY POULTS AND OF CHICKS TO DIFFERENT FORMS OF VITAMIN D

Dr. H. R. Bird, biochemist in charge of poultry investigations, Bureau of Animal Industry, Agricultural Research Administration, U. S. Department of Agriculture, Beltsville, Md., while a member of the Poultry Husbandry Department, Maryland Agricultural Experiment Station, College Park, conducted research on the response of turkey poults and of chicks to different forms of vitamin D.

At the request of the editor of the Du Pont "Agricultural News Letter," Dr. Bird prepared the following abstract of his report, first published in detail in the "Journal of Nutrition," Vol. 27, No. 5.

By Dr. H. R. BIRD

The question as to how much vitamin D is needed by turkey poults has not yet been completely and satisfactorily answered, although there have been numerous attempts to do so. Probably one of the reasons for the failure of different investigators to agree on this matter is the recently discovered fact that poults differ from chicks in the efficiency with which they use different forms of vitamin D, and the chick has been used as the standard test animal in evaluating all vitamin D sources for poultry. The differences reported here between different vitamin D sources with respect to their relative effectiveness for chicks and for poults are similar to the differences previously found by Boucher.*

First Experiment

Thirteen lots of Broad-Breasted Bronze poults at the Maryland Experiment Station were brooded in batteries, and fed a basal diet of the following composition: ground yellow corn 29, wheat flour middlings 10, wheat bran 10, pulverized heavy oats 10, commercial acid-precipitated casein 6, soybean oil meal 12, dried skim milk 8, dried brewer's yeast 6, dehydrated alfalfa leaf meal 5, calcium carbonate 1, defluorinated super-phosphate 1.5, salt 0.5, and Wesson oil 2. One group was fed the basal diet without supplement; 4 were fed different levels of Reference cod liver oil No. 2, which supplied quantities of vitamin D ranging from 80 to 200 A.O.A.C. units per 100 grams of diet; 4 were fed different levels of a commercial cod liver oil supplying 72 to 180 A.O.A.C. units of vitamin D per 100 grams of diet; and 4 were fed different levels of irradiated 7-dehydrocholesterol supplying 41 to 102 A.O.A.C. units of vitamin D per 100 grams of diet. All groups consisted of 15 or 16 poults, except the

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basal group which contained 11. Severe rickets and high mortality occurred in the basal group, and the 2 remaining poults were killed at 3 weeks of age for determination of bone-ash. The poults in the other 12 groups were killed at 4 weeks of age, and the left tibiae removed. According to the procedure of the Association of Official Agricultural Chemists, the percent ash in these bones was determined as a measure of the effectiveness of the various vitamin D supplements.

The results of this experiment indicated that 1 A.O.A.C. chick unit of vitamin D from the commercial cod liver oil was 1.21 times as effective for turkeys as 1 A.O.A.C. chick unit from Reference cod liver oil, and that 1 unit from irradiated 7-dehydrocholesterol was 2.29 times as effective for turkeys as 1 unit from Reference oil. The significance of the difference between the 2 cod liver oils is questionable, but the greater efficacy for turkeys of a given number of units of irradiated 7-dehydrocholesterol is beyond question.

Second Experiment

In a second experiment, 4 groups of 16 poults each were fed irradiated animal provitamin supplying 48 to 120 A.O.A.C. chick units of vitamin D per 100 grams of diet, and these were compared with 4 similar groups fed the Reference cod liver oil No. 2 and with a group of 12 poults that were given no vitamin D supplement. Purebred Black and purebred Beltsville Small White poults and crossbreds between these 2 varieties were used. Otherwise the details of this experiment were the same as those of the preceding one. One A.O.A.C. chick unit of vitamin D from irradiated animal provitamin proved to be 1.83 times as effective as 1 unit from Reference oil.

Probably no importance should be attached to the apparent small difference between the two irradiation products studied, especially since Boucher found a slight difference in the opposite direction. The results of these experiments are in good agreement with those reported by Boucher in indicating that a given number of A.O.A.C. chick units of vitamin D from either of the irradiation products studied is approximately twice as effective for poults as the same number of units from Reference cod liver oil.

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*Boucher, R.V., 1944. Efficacy of vitamin D from different sources for turkeys. J. Nutrition, Vol. 27, No. 5, p. 403. For abstract of Boucher's report, see Du Pont "Agricultural News Letter," Vol. 12, No. 6, Nov.-Dec., 1944.

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FARMERS INTERESTED IN SIMPLIFIED METHOD OF INTRODUCING CHEMICALS INTO SAP STREAM OF WOOD TO LENGTHEN LIFE OF FENCE POSTS, GARDEN STAKES AND POLES

Recent announcement of the discovery of a simple procedure for introducing certain chemicals into the sap stream of newly cut wood to protect it against insect attack and decay is attracting widespread attention among farmers because of the ease with which they can treat fence posts, garden stakes, bean and other utility poles.

Discussion of the use of this new tub or trough method of treating green pine fence posts with chromated zinc chloride to prolong their service, in a recent "Agricultural News Letter" reviewing South Carolina Extension Circular 262 by W. C. Nettles, extension entomologist at Clemson College, brought numerous inquiries for more information. Several farm journals also published articles on the subject, and more recently the U. S. Department of Agriculture issued a statement crediting government scientists with development of the simplified method whereby "fresh-cut saplings are allowed to stand in a wooden tub or trough containing the right amount of chemical in solution for about six hours or until they have taken up the required amount of chemical." The statement adds the principle of introducing chemicals into trees and poles through the sap stream has been known for years, "but until recently the method has not been practicable for use by farmers."

U.S.D.A. Says Chromated Zinc Chloride Best Chemical for Purpose

Chemicals recommended are chromated zinc chloride, zinc chloride, and copper sulfate (bluestone), "of which the chromated zinc chloride is the best," according to the U.S.D.A. statement, which also points out that "it protects the wood longer, and is also less corrosive to wire staples than copper sulfate." The statement continues: "One pound of either of the chemicals dissolved in a half gallon of water will treat a sapling which measures four inches at the base and is about 30 feet tall.

"Best results are obtained when the saplings are treated immediately after cutting from the stumps. When it is not possible to treat them soon after cutting, about one inch should be sawed from the cut end immediately before treating to permit the chemical solution to enter the sap stream.

"Many kinds of both hard-wood and soft-wood saplings or trees of a size easily handled can be treated by the sap-stream method. Pine trees are more effectively protected against damage by insects and decay than are many hardwoods. The treatment is best applied during the spring and summer, particularly on bright sunny days, when the sap flows most rapidly. Hardwoods can be treated only from early spring to late summer. Pine trees can be treated any time except during freezing weather. Evergreens, treated in winter, require about a day to take up the necessary amount of solution."

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CHEMICAL PRESERVATIVE PREVENTS WASTE OF CHICKEN AND TURKEY FEATHERS

Millions of pounds of wet-picked chicken and turkey feathers, formerly wasted or used only as fertilizer, can be saved for industrial processing by a simple and inexpensive preservative recently discovered by research scientists in the United States Department of Agriculture.

Wet feathers, a by-product of poultry-dressing plants, normally decompose too rapidly to permit their collection and shipment to feather-processing establishments. Most dressing plants lack feather-drying facilities, which are expensive, according to Dr. John I. Hardy, senior animal fiber technologist, in Research Achievement Sheet No. 10A issued by the Agricultural Research Administration, U.S.D.A.

Feathers Soaked in Solution of Salt, Hydrochloric Acid, and Water

"The preservative is made by dissolving 15 pounds of common salt, and 1 pint of commercial concentrated hydrochloric acid in 30 gallons of water, for each 15 pounds of wet feathers to be preserved," the Achievement Sheet says. "A tight 50-gallon wooden barrel makes a convenient container for this quantity of solution. Thorough stirring is advisable to make certain all feathers are exposed to the preservative. They should remain in the preservative about 8 hours; a common practice is to keep them there overnight."

The statement points out that the solution costs initially only about 1¼ cents per pound of wet feathers treated, and that the expense is further reduced because several lots of feathers can be preserved in the same solution before its value is spent.

Treated Feathers Shipped from Washington, D. C., to Denver and Back

Practical tests made by Dr. Hardy, his assistant Harold W. Wolf, and associate research workers in the U. S. Bureau of Animal Industry, in cooperation with commercial processors, included shipment of preserved feathers, while still wet, from Washington, D. C., to Denver and return. The feathers were in excellent condition after a month in shipment and subsequent storage, before being washed and processed.

Research Achievement Sheet No. 10A explains that the discovery was a result of wartime research in 1944, when chicken and turkey feathers from poultry-dressing plants were needed to supplement inadequate supplies of duck, goose, and other waterfowl feathers.

U.S.D.A. Says New Preservative "Cheaper, Simpler, and Otherwise Preferable"

"Previous research showed that a preservative prepared in the proportion of 0.55 pound of salicylic acid, 1.1 pounds of benzoic acid, and 30 gallons of

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lukewarm water was satisfactory for preserving feathers," the statement says. "The newer method, using salt and hydrochloric acid, however, is cheaper, simpler, and otherwise preferable."

The statement points out that, among other uses, feathers are excellent camouflage material, and that new methods of curling, processing, and otherwise treating chicken and turkey feathers have greatly increased their suitability for sleeping bags, pillows, and other uses. It adds: "Other lines of experimentation to develop new and profitable uses for chicken and turkey feathers are in progress.

"The salvaging of even 5 per cent of the former annual waste of at least 100,000,000 pounds at a net return of 3 cents a pound over the cost of preservative would save $150,000 to the poultry and feather industries annually."

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DU PONT SCIENTIST WRITES BOOK ON CHEMISTRY OF FORMALDEHYDE

The first English-language book on the chemistry of formaldehyde -- the "molecule coupler" -- is now off the press, the result of several years' work by Dr. J. Frederic Walker of the Technical Division, Electrochemicals Department of the Du Pont Company. This systematic and critical account, No. 98 in the American Chemical Society's Monograph series, published by Reinhold Publishing Corporation, New York ($5.50), sets forth the numerous scientific advances which have been made in this field.

"The growing importance of formaldehyde as a commercial chemical, its many unique characteristics, and its varied applications have created a definite need for the book," says Dr. Walker in the preface, pointing out that the only other publications on the subject are one published by Orlov in Russia in 1908, and another in Germany by Vanino and Seitter published early in this century.

Speaking in a popular vein about the subject of his authoritative, 400-page volume, Dr. Walker said: "To most people formaldehyde is known only as a disinfectant with a powerful and irritating odor. However, to the chemist, it is an ambidextrous coupler -- something like a magic button -- with which chemical molecules can be fastened together to make a wide variety of useful products."

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OUTSTATE CROP AND SOIL TESTS MADE POSSIBLE BY NEBRASKA LEGISLATURE

Early in 1945 the Nebraska Agricultural Experiment Station published Bulletin 373, a progress report on work done in 1944 as the initial step in what the bulletin terms "an outstate testing program for agronomic studies," made possible by an act of the State legislature in 1943.

This law provides for establishment and operation of crop and soil testing fields in areas of the State not fully represented by the State experiment station or its sub-stations.

The bulletin points out that, since the data represent only one year's work, "Definite conclusions should not be drawn from these studies because climatic and other conditions may alter the results in future seasons." However, growers and others interested in the first year's results, part of which are reviewed below, will be sent a copy of Bulletin 373 upon request to the Nebraska Station at Lincoln.

NITROGEN FERTILIZERS INCREASE CORN YIELD IN CENTRAL NEBRASKA TESTS

Three different nitrogen fertilizers, tested on irrigated land in central Nebraska in 1944, increased the yield of corn significantly.

Ammonium nitrate, ammonium sulfate, and "Uramon" fertilizer compound were equally effective, according to Nebraska Experiment Station Bulletin 373, by J. W. Fitts," Nebraska Outstate Crops and Soils Tests - Soil Studies for 1944," reporting results on five outstate fields thought to be deficient in nitrogen, as judged by the cropping history and appearance of the crop. Potassium and phosphorus fertilizers did not increase the yields in these tests.

"Larger increases in yields of corn were obtained from applications of nitrogen fertilizers as a side-dressing at the last cultivation than from application either at the time of planting or in the bottom of the plow furrow," the bulletin says. "In all tests on corn, 40 pounds of nitrogen were almost as effective as 80 pounds per acre."

Considerable Evidence of Nitrogen Deficiency In 1943

The bulletin says that during 1943 there was considerable evidence of nitrogen deficiency in corn, especially in the irrigated areas of central Nebraska. It adds:

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"With this experience in mind, emphasis was put on the use of commercial fertilizers (especially nitrogen) for corn during 1944."

Fields on which the studies were conducted were selected on the basis of cropping history, fertilizer practices, stand of corn, and appearance of the crop. Cultural practices for fertilizer tests were the same as those for the remaining field of corn. All the work, except the application of the fertilizer and the harvesting, was done by the farmer except on one field. Most of the fields on which the nitrogen fertilizers were applied at the last cultivation and in irrigation water were selected when the corn was 2 to 3 feet tall.

The plots receiving nitrogen fertilizers at the last cultivation consisted of 3 rows 50 feet in length. The treatments were replicated five times. The results from applying nitrogen fertilizers at the last cultivation are shown in Table 1.

Table 1. - Effect of applying nitrogen fertilizers at time of last cultivation upon yield of corn (bushels per acre).

County and field	Acre yield due to different nitrogen fertilizers						Dif. for required statistical significance 5% level**
	None	Ammonium nitrate*		"Uramon" fertilizer compound*		Ammonium sulfate*	
Lbs. N	00.0	40	80	40	80	40	
Kearney A	63.7	108.3	111.1	104.2	108.6	----	13.1
Kearney B	65.5	90.7	92.4	86.0	87.2	----	7.2
Valley	26.2	48.1	50.9	45.2	55.2	----	10.5
Phelps A	51.3	89.1	----	91.7	----	90.5	12.5
Phelps B	124.2	142.3	----	----	----	----	----

*Ammonium nitrate contains 32% nitrogen, "Uramon" contains 42% nitrogen, and ammonium sulfate contains 20% nitrogen.

**There are various factors other than addition of fertilizers which influence the difference in yields obtained between treated and untreated plots. The statistical analysis indicates the magnitude of these errors. If the difference between treatments is greater than that required for significance, then it is assumed the difference is due to fertilizer treatment.

"Nitrogen fertilizers increased the yield of corn markedly (18.1 to 47.4 bushels per acre) in the five fields where the fertilizers were applied as a side-dressing at the last cultivation," the bulletin says. "The wide range in yield of the untreated fields (26.2 to 124.2 bushels per acre) indicates nitrogen fertilizers will give profitable responses at a relatively wide range

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of soil fertility conditions, provided other limiting factors are controlled and the fertilizers applied correctly." The bulletin emphasizes the fact that:

"NO SIGNIFICANT DIFFERENCE WAS FOUND BETWEEN THE THREE NITROGEN FERTILIZERS, AMMONIUM NITRATE, AMMONIUM SULFATE, AND 'URAMON,' WHEN APPLIED IN EQUIVALENT QUANTITIES FOR THE NITROGEN WHICH THEY CONTAIN. AN APPLICATION OF 40 POUNDS OF NITROGEN PER ACRE WAS ALMOST AS EFFECTIVE AS 80 POUNDS PER ACRE."

Ammonium nitrate was the only fertilizer applied in irrigation water. The increases in corn yield (20 to 41 bushels per acre) were almost as large as those obtained from a side-dressing at last cultivation. "However, a more uniform distribution was obtained by the latter method, and it was easier to apply," according to the bulletin.

"Uramon" Only Nitrogen Fertilizer to Increase Sugar-Beet Yield In Test

Two tests were also conducted with nitrogen for sugar beets in Hall county in Platte Valley. Only one treatment, an application of 200 pounds of "Uramon" per acre to a field that showed characteristic symptoms of nitrogen deficiency, significantly increased the yield, as shown in Table 2.

The fertilizers were applied as a side-dressing when the beets were about 4 to 6 inches tall and had been blocked and thinned. The plots were 3 rows wide and 75 feet long. Only the middle row was harvested. The treatments were replicated five times.

Table 2. - Fertilizer Tests on sugar beets, Hall County, Nebraska

Fertilizer	lbs. N	Field 1	Field 2*	Sugar content	
				Field 1	Field 2
		Tons/acre	Tons/acre	%	%
None	0	26.1	13.6	----	17.6
Ammonium nitrate	40	26.1	----	14.6	----
"Uramon"	40	25.8	14.5	13.3	17.8
Ammonium nitrate	80	27.4	14.4	13.6	16.6
"Uramon"	80	----	16.6	----	17.8
40 lbs. P_2O_5	--	----	14.7	----	18.0

*Least significant difference (5%) 2.50 tons per acre.

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Agricultural News Letter (Du Pont)
Vol. 13 No. 4 July-August, 1945

NAPHTHALENE ACETIC ACID IN SPRAY OR DUST REDUCES PRE-HARVEST APPLE DROP

Naphthalene acetic acid, the active ingredient in Du Pont's "Parmone" pre-harvest fruit-drop inhibitor, has given "very gratifying" results when used to counteract temporarily the process of abscission or dropping of apples just previous to harvest.

Most of the agricultural experiment stations, especially in states growing apples -- and pears -- on a commercial scale, have published detailed comparative reports on the drop from treated and untreated trees.

At Cornell University, for example, Dr. M. B. Hoffman, extension associate professor of pomology, in a recent statement on what he characterizes as very gratifying results from the use of hormone sprays for this purpose, gives data for two McIntosh trees, in adjacent rows, each tree carrying approximately the same total crop of fruit. He says the tree sprayed September 22 and harvested September 28 had a pre-harvest drop of only 4 per cent, with only 72 apples falling during picking; while the untreated tree, harvested on the same day, had a pre-harvest drop of 16 per cent, with 455 apples dropping off during picking. These results have been duplicated many times in many experiments.

Dr. Hoffman reports that over a period of three seasons, a talc dust containing 0.1 per cent naphthalene acetic acid gave equally satisfactory results in retarding drop on McIntosh as did the same material applied in spray form at concentrations of 10 parts per million. The trees in these tests were young (17 to 20 years) and were quite vigorous. The dust can be applied very rapidly, thus saving valuable time and labor.

Cornell Pomologist Discusses Problems Involved In Harvesting Fruit

Dr. Hoffman explains that apples, as they approach maturity, continue to form red color and increase in size as long as they hang on the tree. He adds:

"It is recognized, however, that there is a definite stage of maturity at which each variety should be picked if the fruit is to develop its best keeping and eating quality. If we could by some means delay dropping indefinitely, we would still have to harvest the various varieties each year at approximately the same time (depending on the season) in order to prevent over-maturity and early deterioration from taking place.

"The process of abscission or dropping of fruit is associated with maturity. The ease with which the apple stem separates from the spur is one of the ways to recognize approaching maturity. The abscission zone is just as strong as any other part of the stem until certain processes accompanying maturity begin to operate. When these processes set in, the walls of the cells of the abscission zone are weakened or dissolved out and a crack or split takes

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place across the base of the stem which cuts the apple off. The rate of respiration and all the ripening processes are increased by an increase in temperature, consequently hot weather results in a greater apple drop than does cool weather.

"There are other conditions such as a high nitrogen level of the trees or a low carbohydrate supply resulting from inefficient foliage that contribute to the total amount of drop, but when all factors are considered, warm weather during this critical period seems to be the most potent.

"In any orchard and for that matter on any given tree, certain apples begin to mature, and as a consequence, abscise or drop before others. There soon comes a time when a large proportion of the crop will reach this condition and if the harvest is not quickly completed, the loss from drop may be heavy. This can happen before satisfactory red color develops, especially if hot weather prevails. High temperatures seem to delay the formation of red color and at the same time hasten these other processes associated with maturity. The harvest of a good crop may start before any appreciable drop has taken place only to have dropping increase from day to day. Under such conditions, a moderate wind or the slight jarring of limbs incident to picking operations will result in a large loss of fancy fruit.

Chemical Delays Drop By Temporarily Counteracting Abscission Process

"The chemical used in the harvest sprays seems to temporarily counteract in some way the process of abscission or some other process responsible for abscission. In this way it delays drop of the fruit. The treatment does not seem to influence the rate of ripening, color formation or increase in size. So long as the apples do not drop, these processes go on at a normal rate which is affected by weather and nutritional conditions. The value of the harvest spray, then, would seem to consist mainly in a protection from excessive drop during the normal harvest of a well-matured crop.

"Generally 1 to 3 days are required for these sprays to become effective. The maximum effect is usually reached in about 5 days. The length of the period of effectiveness varies with the variety and also depends to some extent on weather conditions. The effects of a single treatment may persist for 2 to 3 weeks with most varieties. In the case of the McIntosh, however, this period will not be longer than 7 to 10 days when it seems to end rather abruptly, resulting in the immediate start of drop. McIntosh shows a temporary but very pronounced increase in the rate of respiration as it reaches picking maturity. This may explain why the variety is characteristically a heavy dropper and why the harvest spray has a shorter period of effectiveness on McIntosh than is the case with most other varieties. With any variety the period of effective drop control seems to be shorter during warm weather than it is during cool weather. This may also be associated with respiratory activity.

"Because of the short period of effectiveness on McIntosh the application should be delayed until some evidence of drop is noted so as to obtain the maximum protection at the time when drop is heaviest. The treatment should

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precede the harvest of any given group of trees by an interval of not more than 8 or 9 days.

"This may mean delaying the application on some trees until the harvest of others is under way. A duplicate application on McIntosh, made 4 or 5 days after the initial treatment, has extended the period of drop control for several days beyond that secured with a single spray. Since there is a longer period of effectiveness on other varieties, the application can be more conveniently made prior to the beginning of picking operations. If considerable drop has taken place before the spray is applied, indicating that the abscission of many fruits is well under way, the results are likely to be disappointing. Correct timing of the application is probably the most important single factor in the successful use of the harvest spray. Thorough spraying so as to cover all leaves and reach the fruit stems is also essential.

"The harvest spray is most effective when applied during the warmest part of the day because it probably enters the tissues more readily under such conditions. A concentration of 10 parts per million of the chemical has come to be regarded as sort of a standard recommendation. This is the strength usually suggested on the labels of the various proprietary products. It can be regarded as a general or basic concentration from which variations can be made depending on the variety, vigor of the trees, condition of foliage, and temperature. For varieties on which the treatment has proved particularly effective, such as Delicious, it is likely that 5 parts per million, or one-half the usually suggested concentration would prove sufficient if the trees were vigorous and the temperature at the time of application was 75°F. or higher. This concentration could be increased if cooler weather prevailed. McIntosh and other varieties that offer a similar drop problem should receive a spray containing 10 parts per million."

NOTE: Detailed information about Du Pont's "Parmone" pre-harvest fruit-drop inhibitor, both spray and dust, the active ingredient of which is naphthalene acetic acid, is contained in a Grasselli Chemicals Department leaflet, copy of which will be sent on request to the editor, Du Pont "Agricultural News Letter," Wilmington 98, Del.

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Agricultural News Letter (Du Pont)
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NEW TYPES OF FILMS BROADEN FIELD OF TRANSPARENT FOOD-PACKAGING MATERIALS

Wider use of transparent films in packaging foods grown on American farms, with newer, war-developed films broadening the field in specialized applications, is foreseen by A. F. Wendler, manager of acetate films, Du Pont Cellophane Division. Addressing a group of food technologists recently, Mr. Wendler said that "established pre-war films will return, with improvements, in most of the pre-war channels."

New type films with improvements beyond those now generally known will become available as standard commercial materials and will find logical markets, he added, but it is likely that the newer films will broaden the field of transparent packaging materials instead of resolving themselves as competitive to the previously established types.

"The characteristics of the materials available in the pre-war era were reasonably well understood by the food technologists," Mr. Wendler pointed out, "particularly those wrappings which had been on the market for a considerable period of time, such as cellophane, cellulose acetate, metal foils, and various types of functional papers."

Technical progress in the development of new transparent films "has been very rapid," he said, but "it is very questionable if they have yet reached a state of perfection either from the standpoint of technical characteristics of the material itself, their commercial production on a large-scale basis, stabilized cost to the consumer, or, more important to the food technologist, their commercial application to the products contemplated being wrapped."

Such films as "Butacite" polyvinyl acetal resin, casein, ethyl cellulose, methyl cellulose, nylon, polythene, polystyrene, polyvinyl alcohol, rubber derivatives, starch films, and vinyl copolymers were listed in the group of newer transparents.

Sounding a note of warning regarding the choice of wrapping materials for food packaging, Mr. Wendler said: "Don't be too quick to draw conclusions on the ideal wrap or the advisability of change, as there are many items which should be given full consideration before new adoptions are made."

Choice should be based upon results obtained from fairly extensive tests made upon commercially wrapped packages of the product itself, and should not be based alone upon the characteristics of the wrapper even though its properties may appear to be ideal, he warned.

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